Monolithic frequency comb generators

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Optical frequency combs have revolutionized the ability to measure optical frequencies and posses wide ranging applications ranging from molecular gas sensing to atomic clocks. To date, frequency combs rely on the use of mode locked laser which exhibit both large footprints and generally posses low repetition rate. In this presentation I will review research from my group at the MPQ in which we have succeeded in creating the first monolithic frequency comb generator[1] employing parametric frequency conversion in ultra-high-Q monolithic microresonators. Parametric frequency conversion[2,3] enables to generate frequency combs directly from a CW laser source. Moreover, the small cavity dimension allows generating frequency combs which possess a mode spacing of 88 GHz[4], rendering the approach amenable to applications in high capacity telecommunications or calibration of astrophysical spectrometers. Moreover, control of the spectrum's mode spacing and offset frequency is demonstrated. Time permitting recent developments are highlighted in particular ways to measure and control dispersion discussed.

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